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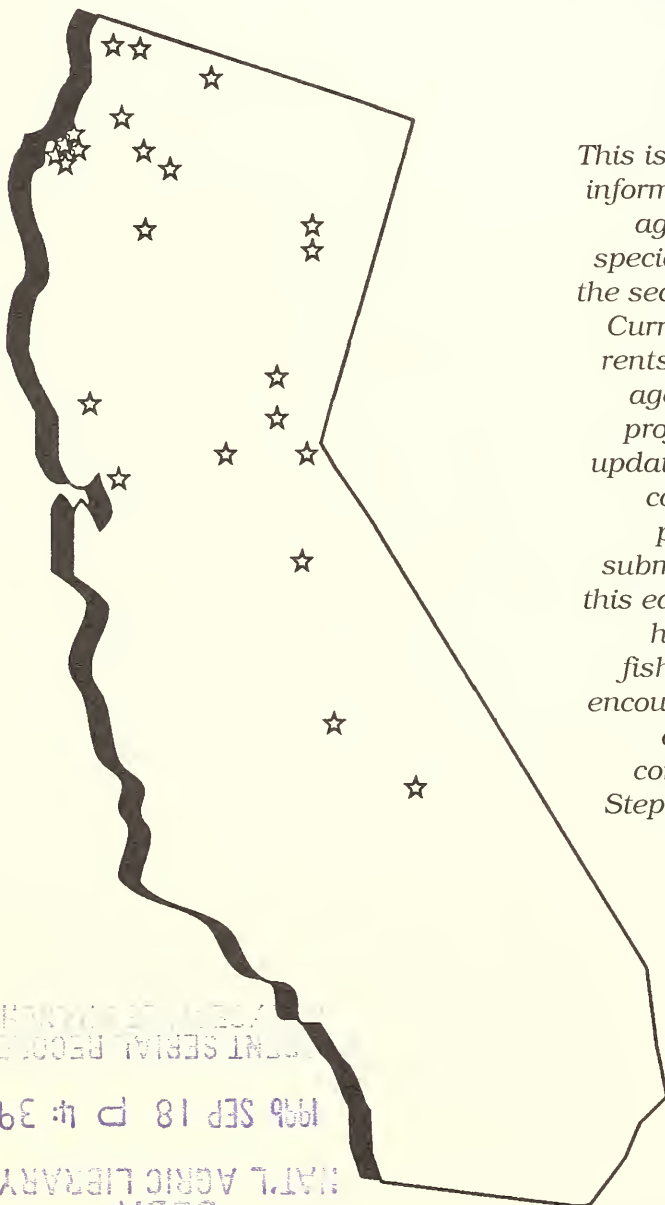
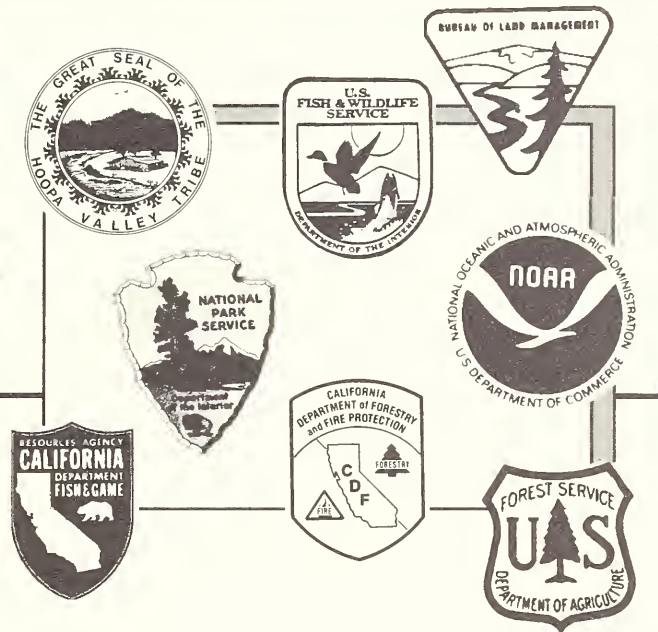
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# FHR

## CURRENTS...

R-5 Fish Habitat Relationship Technical Bulletin  
Number 9 August 1992



### Current Currents

This issue of FHR Currents is an informal information-sharing document written by agency fishery biologists and aquatic specialists throughout California. This is the second annual publication of "Current Currents." The objective of Current Currents is to foster inter-agency and intra-agency communication among fishery professionals by providing a forum for updates on projects in progress, recently completed or planned. We were very pleased with the updates that were submitted from a variety of agencies for this edition. We hope this publication will help strengthen the network among fishery professionals in California. We encourage anyone with a study or report of interest to the FHR community to contact Jerry Boberg, David Fuller or Stephanie Gomes at the address on the following page of this publication.

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USDA  
Forest Service  
Pacific Southwest Region

### ***FHR Currents... Purpose***

The Fish Habitat Relationship (FHR) Program of R-5 USFS has been established to research and develop information on fish ecology and to coordinate effective applications of this knowledge in managing and protecting our fisheries. By relating life state requirements of specific species to physical habitat parameters, we are aiming at our main objective: developing a methodology to manage fisheries through the management of habitat.



### ***Submissions:***

If you wish to submit a paper for publication in the FHR Currents, please write Jerry Boberg, Dave Fuller (Technical Editors) or Stephanie Gomes (Editor/Designer) for information and guidelines at: Six Rivers National Forest, 1330 Bayshore Way, Eureka, CA 95501; or call (707) 442-1721.

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## *Bureau of Land Management*

### **Ukiah District Arcata Resource Area**

Contact: Vicki Campbell  
(707) 822-7648

This summer BLM is venturing into the second year of a systematic watershed/erosion inventory in the King Range National Conservation Area. The south fork of Bear Creek, a tributary to the Mattole River, will again be the focus of the inventory. Using a scaled down version of Redwood National Park's methodology, BLM is looking at roads, mostly old logging roads and skid trails, for water diversions and areas of high erosion potential. A tremendous amount of sediment from human activities has been deposited into the Mattole River watershed and has resulted in the loss of salmonid habitat and severe declines in the wild populations. The purpose of this inventory is to identify areas for systematic rehabilitation to speed the recovery of the watershed before the salmonid populations reach an irretrievable level.

Bear Creek and Honeydew Creek, major tributaries to the Mattole River within the King Range NCA, will be assessed with the assistance of local volunteers for activated landslides and new erosion sources from the recent large earthquakes which were centered in or near the King Range NCA. Stream/watershed restoration projects may be identified from this assessment.

### **Susanville District Alturas Resource Area**

Contact Vanne Mocilac  
(916) 233-4666

The Alturas Resource Area is developing management plans for riparian and fisheries habitat improvements for the recently acquired lands in the Fitzhugh and Jim Creek drainages as well as for the numerous reservoirs in the area. The plans will require FHR data plus coordination with the Modoc National Forest and CDF&G.

Instream habitat improvements on the Cedar Creek drainage will be completed, and monitoring and evaluation of the effects on the fisheries will begin. The restoration plan was implemented in 1990 and involved CDF&G, Cal Trout, a private major landowner, and many others.

FHR studies on the habitat requirements for spawning Modoc suckers (federally endangered) are being conducted to resolve what has been a discrepancy between the last written report of spawning conditions and what has been observed by Modoc NF and CDF&G personnel. The RA will also be involved with the Goose Lake Redband Trout Working Group for developing an action plan for recovery of the species and other endemics of the Goose Lake Basin.

### **Surprise Resource Area**

Contact Roger Farschon  
(916) 279-8101

The Surprise Resource Area will be working on habitat management plans for the High Rock Canyon system (part of a proposed National Conser-



vation Area), Cowhead Slough (location of the Category 1 Cowhead Lake tui chub), and Wall Canyon system (location of the Category 1 Wall Canyon sucker). Initial FHR data will be collected this summer for Cowhead Slough and Wall Canyon. Development of the plans will require coordination with CDF&G, Nevada Department of Wildlife (NDOW), and the USFWS.

### Eagle Lake Resource Area

Contact Geoff Walsh  
(916) 257-0456

The Eagle Lake Resource Area will be working with the Lassen National Forest on the development of a habitat management plan for the Susan River. Both agencies will begin collection of FHR data this summer, with necessary population estimate surveys being performed by CDF&G's Wild Trout staff. To date, cooperators on the project are the Forest Service, BLM, CDF&G, Lassen County, and the Lahontan Regional WQCB. More are expected.

The RA will also be implementing habitat improvements and monitoring on the Willow Creek and Smoke Creek drainages, the latter providing habitat for the Category 2 Lahontan tui chub.

### District-wide efforts

Contact Gina Sato  
(916) 257-5381

In addition to assisting the area offices, the District Office will be working with CDF&G on habitat relationship analyses for fish, invertebrate, and other vertebrate species of the numerous springs in the Honey Lake and Surprise Valley areas using CDF&G Natural Heritage funding. This is in response to the threat of drawdown of aquifers from the Silver State Water Project.

Wherever possible, the District will be looking for cooperative efforts with the Forest Service and others for fulfilling the intent of the Bioregional Strategy Plan.



## California Department of Fish & Game

### Salmon, Steelhead and Anadromous Fisheries Program

Contact: Forrest Reynolds  
(916) 653-4729

Our program continues to make progress toward restoration of salmon and steelhead resources in California, despite budgetary difficulties brought on by the current State deficit. The techniques we employ are varied, reflecting the diversity of problems faced by salmon and steelhead in different geographic regions of California.

On the north coast, much of our emphasis is on restoration of spawning and rearing habitat. A great deal of work remains to be done to correct the damage to habitat that has resulted from past and, in many cases, continuing land-use practices. Many projects, large and small, will be undertaken in future years to fully restore habitat on the north coast. This will require increasing cooperation from landowners, and we are working toward this goal. The Department recently entered into a cooperative agreement with the Pacific Lumber Company for restoration work on company lands. We are hopeful that the atmosphere of cooperation between the public and private sectors fostered by this agreement will spread.

In the Central Valley, availability of water for spawning and rearing, as well as entrainment of salmon and steelhead into diversions, are the highest priority problems. We continue to work for water allocation agreements that give fish and wildlife their fair share of this resource. The drought of the past five years has brought the ongoing competition for water in the Central Valley into the public consciousness. This may cause alterations to past water apportionment practices. Our biologists are continuing to work for agreements providing more water for fish throughout the Sacramento and San Joaquin river systems.

Significant accomplishments in the Sacramento River system include a successful court action against the Anderson-Cottonwood Irrigation District over operation of their Bonneyview Pumps diversion in Redding, as well as a curtailment of diversion by the Glenn-Colusa Irrigation District near Hamilton City. These actions occurred because these diversions were incidentally taking endangered Sacramento River winter-run chinook salmon in the diversion of the water.

In the San Joaquin River system, chinook escapement dropped from approximately 25,000 adults in 1987 to fewer than 900 in 1991, prompting the Department to request closure of the river and its tributaries to sport angling in 1992. In addition to habitat restoration activities, our biologists are nearing completion of the process for selecting a site for construction of a salmon and steelhead hatchery on this river system.

The statewide grants program has taken significant cuts in funding. We are hopeful that our constituents will be successful in working with their elected representatives toward providing additional funding for this badly-needed public involvement aspect of fishery restoration in California.

## Inland Fisheries Division, South Fork Trinity River Steelhead Project

Contact: Carrie E. Wilson  
(916) 623-5049

The California Department of Fish and Game, South Fork Trinity River Steelhead Project is involved in a number of studies of steelhead throughout the year. This work is part of the Trinity River Restoration Program under contract to the United States Bureau of Reclamation.

We operate the Sandy Bar weir in Salyer at a site 1.4 miles from the Trinity River confluence during the fall and winter months. All salmon and steelhead are captured, measured, tagged and released. The weir enables us to monitor the migration into the SFTR basin in order to estimate the total annual escapement.

We examine steelhead spawner distribution and tributary entry timing through foot survey examinations of SFTR basin tributaries from March through May. We are also evaluating the quality and quantity of available spawning habitat by measuring the physical and hydraulic parameters of all redds, and by recording the characteristics and quality of the substrate and associated cover.

Angler harvest is evaluated within the basin through a stratified random creel census survey of anglers, and the sport harvest rate is determined from the return of \$10 reward tags by anglers.

Steelhead life history patterns are studied through intensive analysis of scales taken from both adult and juvenile fish. Adult steelhead scale samples are read using a microfiche reader and juvenile scales are read using the Optical Pattern Recognition System computer program.

We have been studying the seasonal habitat use by juvenile steelhead in Eltapom Creek during different times of the year. The creek was first habitat-typed and divided into one of five basic habitat types: cascades, pools, riffles, runs and step-runs. Twenty-

four of the 72 habitat units are randomly selected for sampling, according to the relative abundance of the five basic habitat types. Each unit is isolated with block nets to prevent any immigration or emigration of fish during electrofishing. The successive removal-depletion method is used to assess fish populations and utilization of the various habitat type units.

## Inland Fisheries Division Trinity River Fisheries Investigations Project

Contact: Mark Zuspan  
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The California Department of Fish and Game, Trinity Fisheries Investigations Project will undertake four principle tasks in the Trinity River basin this year. This work is part of the Trinity River Restoration Program under contract to the United States Bureau of Reclamation.

### *Task 1: Salmon spawner surveys in the upper Trinity River Basin*

Salmon spawner surveys, which we began in 1988, will be conducted again this year. The study area includes the main stem and tributaries of the Trinity River between Lewiston Dam and the North Fork Trinity River (inclusive). The surveys have three main objectives: (1) determine the distribution of spring and fall-run chinook and coho salmon spawning in the study area; (2) determine the incidence of pre-spawning mortality among naturally spawning salmon; and (3) determine the size and sex composition and incidence of marked/tagged salmon of naturally spawning salmon.

### *Task 2: Capture and coded-wire tagging of naturally produced chinook salmon in the Trinity River Basin.*

We will be trapping and tagging naturally produced chinook in the Trinity River again this year. Trapping begins early January and continues until we

have tagged 100,000 chinook or the hatchery releases their fingerling chinook. This will be our fourth year of operation. Our main objective is to determine, for naturally produced adult chinook, survival and contributions to the ocean and river fisheries and spawning escapement. In addition, we monitor emigration timing and growth through our trapping season.

### *Task 3: Survival and contributions to the fisheries and spawner escapements made by steelhead produced at Trinity River Hatchery*

Since 1990 we have marked all steelhead released from Trinity River Hatchery (TRH). Steelhead are given a fin-clip which identifies their brood year and age at release (either one or two year old). The objective of this Task is to determine relative return rates and contributions to spawning escapements and the fisheries made by steelhead produced at TRH. We are evaluating experimental hatchery management practices aimed at increasing adult return.

### *Task 4: Life history, distribution, run size and harvest of spring chinook salmon in the South Fork Trinity River Basin.*

We began a new study in 1991 to determine the status of spring-run chinook in the South Fork Trinity River basin. Field operations include the installation of adult trapping stations, spawner/redd surveys, and monitoring juvenile emigration. The objectives of this Task are to: (1) determine the size, composition, distribution and timing of adult spring-run chinook; (2) determine the angler harvest of spring chinook salmon and; (3) determine the life history patterns of spring-run chinook salmon produced in the South Fork Trinity River basin.





## *CA Department of Forestry & Fire Protection*

### **Coast Region**

Contact: Brad Valentine  
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The California Department of Forestry and Fire Protection regulates timber harvest on private lands in the state. This is done primarily through application and enforcement of the Forest Practice Rules promulgated through the California Board of Forestry. A main purpose behind many of the rules is protection of fishery habitat value. Among those are requirements for erosion control, stream buffer strips, certain prohibitions on roads and landings, and limitations on logging techniques in specific situations.

Until late 1990, CDF did not have biologists on staff, except in the agency's policy guidance division — Forest and Range Resource Assessment Program (sometimes referred to as FRRAP). Until then, fishery habitat was given consideration primarily through CDF&G's participation in project Review Teams. Since that time, biological issues are still reviewed by CDF&G and CDF has been allotted four biologists state-wide. Currently, the positions in Redding (Region II) and Santa Rosa (Region I) are occupied, the position in Sacramento

is vacant, and the position in Fresno (Region III) has not been filled. My region, the North Coast Region, extends from the Oregon boarder through Santa Cruz county and includes all the coastal and bay area counties. My job requires that I deal with both fisheries and wildlife issues from the regulatory perspective.

Relative to fisheries, I have not initiated any major projects. I have performed generic habitat inventories and collected and analyzed some substrate analysis. I have requested funding for hydrothermographs to monitor the temperature-control effectiveness of the buffer strips in intensively managed drainages, and intend to repeat some of Burns' early 1970s studies on logging impacts to fishery and habitat.

I find the publication FHR Currents very helpful in providing insight to issues and other's projects. I would hope that the information I have provided will spur more coordinated monitoring and study to achieve effective fisheries conservation and management. As stated above, CDF currently has two vacancies at the Associate level in state government. If anyone might be interested, they could contact me for information.

## Cooperative Extension/Sea Grant Marine Advisory Programs University of CA/Oregon State University

### Smith River Chinook Study

Contact: Jim Waldvogel  
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In the fall of 1980, a salmon spawning escapement study was started on the West Branch Mill Creek, a major fall chinook salmon (*Oncorhynchus tshawytscha*) spawning tributary of the Smith River, Del Norte County, California. The purpose of the study is to determine the relative abundance of spawning fall chinook salmon in a defined study section over a 20-year period as habitat changes occur. The reason for implementing this research was the lack of any historic long-term spawning escapement estimates for the Smith River system.

The 1.7 mile (river miles) study section is located on private land owned by the Miller Rellim Redwood Company. The private land is adjacent to California state park land and Redwood National Park on the north and south boundaries. At the inception of the

study in 1980, the West Branch Mill Creek watershed encompassed only uncut old growth redwood stands. From 1986 through 1991, small sections of old growth redwoods have been clear cut each year.

The long-term monitoring of the chinook salmon spawning population over a 20-year period may reflect some of the present habitat changes in the system. However, there have also been severe long-term drought effects and poor ocean habitat conditions during this same study period that are fluctuating chinook adult returns.

The continuation of this research project will provide a long-term database to guide fishery managers on the Smith River system. The designation of the Smith River as a National Recreational Area in 1991 has created a potential for necessary in-river fishing regulations that would protect this unique and pristine watershed. Without good, long-term fishery data, management decisions may be made unwisely.



### Hoopa Valley Business Council

### Fisheries Department

Contact: Robert Franklin  
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Over the past year, the Hoopa Tribal Fisheries Department has been pursuing restoration of anadromous fish populations in the Klamath-Trinity Basin

through a diverse program including: watershed-based restoration planning and erosion-prevention projects for several Reservation watersheds with significant fisheries values; a Trinity River channel maintenance flow study; monitoring of smolt production in streams; researching changes in fluvial sedimentology as related to the quality of spawning habitat in key Reservation streams;

management of on-Reservation fish harvesting; and acquisition of improved streamflows in the Trinity River through legislative and administrative actions.

In some joint-ownership basins, restoration planning called for federal/tribal coordination such as memorialized in the Mill Creek Coordinated Resource Management Plan. In this case, road surveys and air photo analyses -- integral to erosion prevention planning -- were conducted by the Tribe's sub-contractor (Pacific Watersheds Associates) with the full cooperation of Six Rivers National Forest.

Funding for the Trinity River Channel Maintenance Flow Study was provided by the US Bureau of Reclamation and the Hoopa Tribe. This state-of-the-art research project will provide prescriptions for

periodic high-flow releases from Lewiston Dam to approximate pre-dam hydrologic conditions. The Tribe is assisted in this study by consultants Dr. William Trush of Humboldt State University, and Trinity Restoration Associates.

The Tribe continues to use its federally-reserved fishing and water rights in obtaining increases in fishery flows from federal water projects on the Trinity and Klamath rivers. Also, the Tribal Fisheries Department has become actively involved in operational planning for these US Bureau of Reclamation (BOR) facilities, and is currently assisting BOR in developing operations plans addressing fish habitat needs and end-of-season reservoir carryover storage.



## *National Oceanic & Atmospheric Administration*

### **National Marine Fisheries Service Southwest Region**

Contact: Chris Mobley  
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The Santa Rosa Northern Area Office of the National Marine Fisheries Service's (NMFS) Southwest Region is responsible for NMFS marine, estuarine, and anadromous fisheries management in Northern California, from Monterey to Crescent City.

The Protected Species Division, which includes two fishery biologists in the Santa Rosa office, is currently involved in Endangered Species Act consultations for the Sacramento River winter-run chinook salmon.

The Habitat Conservation Division includes two fishery biologists, a water-policy coordinator, a fish

passage engineer, and an area supervisor. The Habitat Conservation Division reviews Environmental Impact Statements/Reports, Corps of Engineers Public Notices, and other environmental documents pursuant to the Fish and Wildlife Coordination Act, the National Environmental Policy Act, the Marine Protection, Research, and Sanctuaries Act, the Clean Water Act, and other laws.

Staff routinely review and provide comments on controversial projects that could potentially affect salmon and steelhead. Recent examples include the Auburn Dam, Folsom Reservoir Reoperation, the New Los Padres Dam (on the Carmel River), DWR's Delta projects (Los Banos Grandes, the South Delta Water Management Project, the Temporary Barriers Project, and the North Delta Water Project), gravel mining (on the Smith, Klamath, Trinity, Mad, Eel, Van Duzen, Garcia, Russian, and Gualala rivers), the South Fork Eel River's Benbow Dam, and San Francisco Bay's Port of Oakland dredging projects.



Because of our concern on the effects of elevated temperatures in the upper Sacramento River on the winter-run chinook salmon, the NMFS Southwest Region funded a study that began in 1989 to assess chinook salmon egg temperature tolerance. The study is being conducted by the US Fish and Wildlife Service's Northern Central Valley Fisheries Resource Office, and involves exposing fall-run chinook eggs to various temperature regimes and measuring the resultant effects on egg viability.

In May, 1992, we are beginning a study in collaboration with NMFS scientists from the Northwest Region's Fishery Science Center in Seattle entitled,

"Contaminant Levels and Associated Biological Effects in Outmigrating Juvenile Chinook Salmon in San Francisco Bay." The study's objectives are to determine: 1) the degree to which outmigrating juvenile chinook salmon are exposed to toxic chemicals during their transit through selected portions of San Francisco Bay; and 2) determine if certain biological effects are associated with the contaminant exposure. The study grew out of the concern that exposure of juveniles to chemical contaminants in San Francisco Bay could be contributing to the decline of the winter-run chinook salmon.



## *Redwood National Park*

Contact: David Anderson  
(707) 488-2911

The Fish and Wildlife Branch of Research and Resource Management Division at Redwood National Park (RNP) has been actively implementing several long term fisheries monitoring projects.

During the winter, ongoing redd and carcass stream surveys monitor index streams in the national park and adjacent state park. Besides following run trends, the survey data is used to evaluate management activities such as the modification of a log jam barrier, the removal of a dam, and instream restoration projects.

Summer and winter monitoring of US Highway 101 Bypass streams is used to determine the effects of highway construction on streams in the Prairie Creek and Klamath River watersheds. The 9-year summer bypass monitoring project has used cross-section and longitudinal surveys, freeze-core gravel sampling, stream mapping of physical features and surface gravel quality, benthic invertebrate sampling

and photo documentation to determine the effects of sediment introduced into the study stream reaches by highway construction. A three-year winter monitoring project has determined the effects of introduced fine sediment on incubating salmon eggs in artificial redds. This included fertilized egg-to-hatching, and egg-to-emergence survival rates. Dissolved oxygen concentrations, apparent velocity, and percent fine sediment and organic matter were measured in the egg pockets. RNP hydrologists and geomorphologists measured sediment transport with programmable automatic samplers and installed several automated staff gages to determine the amount of sediment entering and leaving the impacted area.

A Redwood Creek estuary monitoring project, ongoing since 1980, has determined the yearly numbers and growth rates of juvenile chinook salmon and steelhead trout utilizing the estuary each summer and fall. Water quality is measured to monitor habitat conditions and evaluate the effectiveness of a culvert placed through a flood control levee to improve water circulation in a slough that



previously was cut off from the main embayment. The eventual goal is to restore the area to a naturally functioning estuary.

In addition to a watershed rehabilitation program that removes old logging roads, RNP contracted for a stream habitat typing and large organic debris inventory of Bridge Creek, a tributary to Redwood

Creek, to aid in planning and placement of instream structures. Habitat typing after project implementation was used to evaluate the effectiveness of some of these structures. Also, habitat typing was used to evaluate effects stream rehabilitation efforts before and after removal of a dam. More stream restoration work in the park is planned in the future.



## *U.S. Fish & Wildlife Service Coastal California*

### **Fishery Resource Office**

Contact: Bruce Halstead  
(707) 822-7201

During the summer of 1991, Coastal California Fishery Resource Office (CCFRO) completed fish population surveys and habitat mapping for nine miles of the Merced River in Yosemite National Park. This is a cooperative effort with the National Park Service (NPS) and California Department of Fish and Game. This summer, NPS will begin implementing recommendations made by CCFRO for restoring the habitat of the Merced River to

benefit the fishery resources. CCFRO will monitor the progress/results of the restoration efforts over the next several years.

CCFRO crews continue to work in the Klamath and Trinity river systems to monitor fish population trends related to habitat types throughout these river systems. In 1991, we began a monitoring program on Wooley Creek, a tributary to the Salmon River in the Marble Mountains Wilderness Area, to gather information on long term temperatures and summer steelhead population changes. This information will be used to assess the gradual changes that would occur with global warming.



## USDA Forest Service

### Klamath National Forest

Contact: John R. West  
(916) 842-6131 (R05F05A)

*Klamath River Spring-run Chinook Salmon Conservation: Status Report*

(How to make a U-turn  
on the road to extinction)

Spring-run chinook salmon (*Oncorhynchus tshawytscha*) were once abundant in California rivers, including the Klamath. Prior to the turn of the century, spawning populations in the state may have exceeded 350,000 fish (California Department of Fish & Game). Unfortunately, all populations have suffered serious declines in the past century, and the Salmon River (tributary to the Klamath) may harbor the largest remaining wild population in the state. The Salmon River population is also in serious trouble, as evidenced by spawning escapement of fewer than 500 individuals in at least six of the past 12 years.

In the fall of 1990, Klamath National Forest Supervisor Barbara Holder asked the Pacific Southwest Regional Forester to designate this stock group a sensitive species, which he did. The Forest, aided by a steering committee of interested citizens and agency representatives, developed a lifestage survival-based conservation strategy which linked freshwater survival rates to existing habitat conditions. Existing population and habitat conditions were compared to a Desired Future Condition founded on optimum-condition habitat elements for anadromous salmonids west of the Cascade Range provided by Dr. James Sedell. Management objectives were generated from the broader Desired Future Condition statement, and specific work

activities (Action Options) were identified to meet the management objectives.

The strategy and its long-term budget was presented to the Regional Forester in November 1991 and with his support was forwarded to the Washington Office. An additional \$250,000 was allocated directly to the Klamath National Forest in FY 1992 to begin implementation of the strategy. As a result of a strong Forest Supervisor and Management Team commitment to implement the strategy, the \$250,000 allocation will result in accomplishment of work valued at approximately \$498,000. This leveraging was accomplished principally through multi-functional funding of many work activities.

The following accomplishments are planned for the 1992 program:

- a. Completion of a Genetic Stock Identification study in cooperation with the U. S. Fish and Wildlife Service and U. C. Northridge.
- b. Strengthening of law enforcement efforts through cooperative agreement between U. S. Forest Service and California Department of Fish & Game forces to reduce fish poaching.
- c. Completion of an Environmental Assessment which analyzes and recommends alternatives to supplement wild fish production through genetically "low-risk" bioenhancement techniques.
- d. Placement of submerged instream woody cover structures in critical habitats virtually devoid of such cover to reduce poaching effectiveness and increase over-winter juvenile survival.
- e. Inventory of adult fish spawning and holding habitat utilization to identify habitats where such use is concentrated or absent.

- f. Planting of conifer and deciduous trees on over 84 acres of riparian area to moderate summer high and winter low water temperatures.
- g. Habitat condition assessment of Wooley Creek and re-assessment of East Fork of South Fork Salmon (five-year-old survey) to serve as base line for monitoring habitat condition changes in the future or to refine prescriptions for future habitat modifications proposals.
- h. Stabilization of erosive granitic road surface by reconstruction from inslope to outslope and surfacing with crushed aggregate to reduce sediment effects on approximately 50 acres of downstream spawning and rearing habitat.
- i. Road bedding/culvert removal of a 4.5 mile long erosion-prone road affecting 70 acres of habitat in Wooley Creek and the mainstem Salmon River.

Though there is a significant amount of work to be done as identified in the strategy, FY 1992 program is a good start. The Forest looks forward to significant program increases in the next few fiscal years and is optimistic that spring chinook salmon populations can be re-built to a stable level of 500 or more natural spawners within the next 15 years.

A bit more cooperation from Mother Nature in the form of normal precipitation/snowpack and productive ocean conditions would certainly be appreciated.

## Lake Tahoe Basin Mgt. Unit

Contacts: Jeff Reiner/Julie Perrochet/Gayle Ellis  
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The Lake Tahoe Basin Management Unit continues to coordinate the inland FHR program as a partnership between all the inland fisheries biologists. In 1992 the FHR program for the inland forests includes the development of the desired future condition (DFC), cumulative watershed effects (CWE) analysis on fisheries, the demonstration watershed, and instream flow training. The Lassen, Sequoia, Six

ivers, Stanislaus, and Basin forests are involved in the desired future condition. This involves working with the National Park Service in Lassen, Sequoia, Yosemite, and Channel Islands national parks. The Sierra National Forest is involved in the cumulative watershed effects analysis. The Tahoe National Forest is developing the demonstration watershed. The Plumas and Inyo national forests are involved in instream flow training for the Region. All of these projects are coordinated and developed with the Regional Office and the Pacific Southwest Station.

On the Basin, the stream assessment work continues, but with a new partner. The California Tahoe Conservancy has approved a grant to the Basin for the completion of the basin wide fisheries habitat assessment. This grant will enable the Forest to double its assessment efforts. The Tahoe Conservancy will be a partner in funding fisheries habitat improvement projects, based on the analyses of the assessment work.

The fisheries staff has undergone some changes, with the departure of Julie Perrochet to a detail on the Klamath National Forest. Annelise Carleton will take over Julie's responsibilities while she is on the Klamath.

## Mendocino National Forest

Contact: Emil Ekman  
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In 1992 the Mendocino stream survey crews covered the target number of miles in some very difficult terrain. The work went without incident other than a twisted ankle, a bout of the flu, and a rattlesnake that fell on the head of a terrified surveyor.

In recent years more attention has been given to the lakes on the Forest since that is where most of the fish user days occur. Water is a scarce resource in this part of the world and the lakes are extremely important to recreationists who enjoy camping and fishing nearby. All the Mendocino lakes contain trout, although all waters below 5,000 feet provide only marginal rainbow habitat. In spite of summer



surface water temperatures of nearly 90 degrees, at least some trout find cool seeps and survive to another season providing anglers with the opportunity to catch fish up to several pounds and 25 inches in length. Two of the areas are very successful two-story lakes that provide quality bass fishing in the more shallow and warmer water and a put-and-take trout fishery elsewhere.

In an attempt to make a good fishery even better, we placed numerous brush rows and planted grasses, black willow, and button willow in the littoral zone of Lake Pillsbury in cooperation with the California Department of Fish and Game, the California Conservation Corps, and Pacific Gas and Electric. Last summer the assumption that brush piles mean more bass was called into question by Dr. Bill Davies from Auburn University who visited Pillsbury on his swing through Oregon and California. He also pointed out that further study of the recruitment and survival is needed to make the kind of judgements needed to do things like set size and catch limits for bass. As that is normally the province of the Department of Fish and Game, we need to re-evaluate our respective roles. We appear to be at a crossroads in this matter.

Lake Pillsbury also contains Sacramento Squawfish, an introduced predator now recognized to be the scourge of the Eel River. If you ever wondered if one person can make a difference in the world this may be an excellent example of how much of a difference is possible. The introduction of squawfish is attributed to one man who introduced them as "summer trout" that could be part of the prey base for rainbows. Pillsbury and its tributaries filled with squawfish and they continued to wash downstream till they filled all suitable habitat. The dismal returns of anadromous fish to the upper river may be due in large part to the presence of the squawfish that eat large numbers of young salmonids. How bad are the anadromous returns? By mid-March, 1992 the count at the Van Arsdale Fishery Station ladder was five chinook (all males), and steelhead counts of eight males, 27 females, and five half-pounders. That compares to some 500 chinook and 1,500 in a previous record several years ago. How do we meet the IMP and RPA targets with returns of that magnitude?

Bass were introduced into Pillsbury several years ago with the expectation that they would eventually bring the lake squawfish into check. In 1989 the Mendocino, the CDF&G, and UCD cooperated in a study to determine the feeding habitats of bass and squawfish of different age classes. The results are encouraging. We found that bass do prey on squawfish, although squawfish quickly grow too large to be eaten. A second reason that bass were introduced was that they would provide a warmwater fishery. The bass population appears to be getting much larger and the fish are now sought after by anglers.

## Plumas National Forest

Contact: Leslie Mink  
(916) 283-2050 (R05F11A)

The fisheries program on the Plumas is growing! We began the fiscal year by hiring Lee Morgan as Assistant Forest Fishery Biologist. Lee came to us from the BLM as a district fishery biologist in eastern Oregon. We are now on the verge of filling a coop-ed position also. This year, we also decided to not have a fisheries crew in the SO, but to send more money to the districts to support individual district crews. It should be an interesting year with this change.

The local Coordinated Resource Management Group is really heading up some interesting projects using Rosgen-style rehabilitation techniques. Meander re-designs, floodplain reconstruction, etc. Local schools are heavily involved with the monitoring and re-vegetation. These projects are very successful on many levels. Someone in the group would be happy to give you a tour if you're ever in the area!

The fisheries program is working on a Challenge Cost-Share project with a graduate student from Humboldt State who is interested in studying our high mountain lake fisheries. She is still formulating her thesis, so if anyone has burning questions concerning high mountain lakes, let me know and maybe she can research it.



All in all, the program is looking toward increasing the fisheries expertise on the Forest by working with other disciplines, working with the districts and training.

## Sequoia National Forest

Contact: Matthew Lechner  
(209) 784-1500 (R05F13A)

The program on the Sequoia continues to evolve and expand. We are working with the local fly fishing groups on habitat improvement, fish population sampling, watershed health issues and partnership agreements for our major rivers. The Kern River has been receiving a lot of interest and enthusiasm. The restoration efforts for Little Kern golden trout and Kern River rainbow trout are continuing. If all goes according to plan the chemical treatments for golden trout restoration should be finished up this year. We will be doing the final treatment of 17 miles of the Little Kern River and will need 10-12 people to help out. If anyone is willing to help and would like to gain some valuable experience please contact Teresa Pustejovsky on the Tule River District (209)539-2607; R05F13D52A. In other Kern River news, Southern California Edison will be doing a creel survey on the Lower Kern River to determine the angler use of a non-native smallmouth bass fishery.

Several activities were planned for National Fishing week including: involvement with a kids fishing tournament on Lake Isabella, a kids fishing program at Hume Lake with the Fresno Conservation Flyfishers, a kids fishing day at Big Meadow with the Kaweah Flyfishers, and a monitoring trip to some past habitat work at Fish Creek with Trout Unlimited.

Lake Isabella, a recent addition to the Forest, has brought us an additional two million recreational visitors and a lot of them like to fish! The Cannell District is taking an active role in a cooperative effort with CDF&G to evaluate the potential of the Lake and then help it live up to it. The district wants the cooperative management program at Isabella to be a model for the Region to follow in promoting warmwater fisheries. They have hired a fisheries

biologist for the lake. Welcome Tina Tharalson to the forest and region! We are also helping the Angeles NF with a warmwater program for Pyramid Lake. The way to relieve some pressure on our streams and native fisheries is to make the reservoir fishing so good that people can't stay away!

In addition, we have a cooperative project going with the Sierra NF and Stanislaus NF. We are conducting amphibian surveys in cooperation with PSW, Cal Academy of Science and David Martin of Canorus Limited. Canorus is the name of the company and also happens to be the specific name for the Yosemite Toad. You can figure out the "limited" part.

The bottom line is a healthy program and happy people on the Sequoia.

## Shasta-Trinity National Forest

Contacts: Richard A. Irizarry  
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Debby Selby, McCloud RD  
(916) 964-2184 (R05F10D61A)

The Shasta-Trinity National Forest recognizes the redband trout as an "emphasis" fish species. An "emphasis" species is one of high public interest and demand. The management goal for an "emphasis" species is to maintain or improve habitat capability when economically and biologically feasible. Originally native to much of the Pacific Northwest, redband trout distribution has shown a dramatic reduction, primarily owing to hybridization and competition with non-native trout. They now appear as small, isolated populations in a few stream drainages. The redband trout appear to tolerate higher siltation conditions, lower water velocity situations, and higher water temperatures than typical for most trout.

A Comprehensive Habitat Management Plan for redband trout within the McCloud River system was developed cooperatively between the Forest Service and the California Department of Fish and Game

(Bacon, 1980). In the action plan, top priority was placed on acquiring private land at Trout Creek, especially land adjacent to its essential habitat.

In June 1987, the Shasta-Trinity National Forest acquired 292 acres adjacent to Trout Creek. The private land had been previously abused by uncontrolled livestock use, moderate damage to the understory from timber harvesting, excessive off-road vehicle use, unregulated water drafting for dust abatement, and indiscriminate stream crossings without due concern for waterflows or dependent fish life. Yet this upper wet meadows complex is still thriving and heavily favored for annual use by hunters, fishermen, black powder enthusiasts, as well as other groups and dispersed recreation campers. The stream channel in the lower meadows complex reflects a decreased water table lowered by perhaps natural stream cutting about 15 to 20 below its initial bank height. It will definitely be a challenge to restore the lower meadows complex.

In April 1989, the Forest Service acquired another 40 acres at Trout Creek. Both actions have allowed the Forest Service to consolidate ownership of the essential redband habitat at Trout Creek into the National Forest System and promote the future management of this basin for redband trout.

Significant erosion of streambanks and denuding of streamside vegetation from overgrazing was documented by numerous California Department of Fish and Game reports. In July 1987, SO Fisheries Unit personnel verified previous CDF&G observations noting extensive damage from range cattle including the degradation of streambanks, destruction of riparian vegetation, water pollution, and overgrazing of the entire area surrounding the stream. The accompanying stream survey documented that habitat for 1+ and 2+ fish seemed to be the limiting factor on Trout Creek.

In May 1988, the McCloud Ranger District prepared a Trout Creek Management Plan for public recreation opportunities and fish rehabilitation projects. This plan allows for the following actions: (1) dispersed public camping outside of a 50-foot streamside management zone with a 14-day stay limit; (2) closure of roads causing damage to the

riparian habitat; (3) controls livestock grazing; (4) prohibits off-road vehicle use within meadows and riparian areas; (5) permits water drafting in designated areas only; and (6) calls for the implementation of fish habitat restoration projects to protect the redband trout.

In July 1988, and again in September 1988, Forest Service personnel completed fish habitat improvement projects in Trout Creek. The McCloud schools completed additional fisheries and streambank improvement projects in the summer 1991 and additional projects were planned for June 1992. Recommended projects on Trout Creek center on the need to deepen pools, stabilize banks, revegetate streambanks, exclude cattle, and acquire adjacent land parcels. In 1989, 40 acres within Trout Creek Meadows were fenced off for added protection from random cattle grazing. In June 1992, Trout Unlimited volunteered to build an additional three miles of fence to protect the lower meadows from grazing cattle. The monies and project planning for this project will be implemented through a partnership with the California Department of Fish & Game and McCloud Ranger District.

A new habitat evaluation survey termed "habitat typing" was employed at Trout Creek in 1990 by the SO Fisheries Unit. Habitat typing is a procedure which allows biologists to identify some factors limiting fish production in streams. Surveyors typed the essential redband trout habitat in Trout Creek finding wild populations of redband trout and a few scattered brook trout.

The Shasta-Trinity National Forest is in the process of developing a fisheries/watershed partnership program for Trout Creek with the McCloud School District, Sierra Pacific Industries, Campbell Corporation, California Department of Fish and Game and Trout Unlimited under the auspices of the Adopt-A-Watershed program. Annual involvement is planned in monitoring and restoration activities by all parties that will stimulate the recovery and promote the health of redband trout and their habitat in Trout Creek. Additionally, Trout Creek will provide a "living laboratory" for school grades kindergarten through high school to integrate into their curricu-



lum for a wide variety of subjects including science, mathematics, history, geology, and archaeology.

The future will focus on the development of specific plans for population and watershed monitoring at Trout Creek by the Forest Service.

## Sierra National Forest

Contact: Mary Kay Buck  
(209) 487-5250 (R05F15A)

For the second year, the Sierra NF will again use crews from PSW Berkeley to conduct our stream inventories. We all learned from the experience last year and decided to try it again this year. Both organizations have benefited from our cooperative effort -- the Forest biologists are relieved of some of the administrative burdens of running crews and PSW can pursue pertinent research questions while conducting the inventories.

Two research questions PSW looked at last year were crew variability in the information that was collected (identifying reaches, Pfankuch ratings, habitat types) and LWD volume and movement on Sierran streams. Follow-up work will continue in these areas this year.

This year we will also incorporate more quantitative methods to gather our inventory data. For instance, instead of ocular estimates of substrate we will do pebble counts. Instead of estimating embeddedness, we will measure embeddedness of particles along transect lines. We will also include quantitative measures of LWD on all our stream inventories. Using quantitative methods, we hope to better define our desired future condition criteria with values applicable to the Sierra.

If the quantitative methods prove successful this year, it is hoped that they can be adopted region-wide in succeeding years. The Regional data base will then be based on repeatable methods and we can move ahead towards developing solid desired future condition criteria for each geo-biological province in California.

The Sierra NF (in conjunction with the Sequoia and Stanislaus national forests) has entered into a Challenge Cost Share Agreement with Dave Martin to conduct distribution surveys for amphibians on all three forests. Dave Martin, with the Department of Biological Sciences, San Jose State University, has studied the Yosemite Toad extensively in the central Sierra Nevada region. Dave worked with Mark Jennings and Hartwell Welsh to develop a protocol for conducting anuran surveys. The objectives of this protocol are to provide a survey method that is comparable among sites and repeatable over a number of years by different investigators, as well as covering the array of annurans present. The three species that are of particular concern and on the decline in the Sierra Nevadas are the Yosemite toad (*Bufo canorus*), mountain yellow-legged frog (*Rana muscosa*) and the California red-legged frog (*Rana aurora*).

Earlier this year the Sierra NF entered into a Challenge Cost Share Agreement with R.J. Beamish, renowned lamprey expert, to conduct species identification surveys for the Kern Brook Lamprey in the Kings River drainage. The Kern brook lamprey is a non-parasitic lamprey endemic to the San Joaquin drainage and is a Class 2 state listed species (species of special concern). We plan to conduct the survey in two phases. This year we revisited several sites on the Kings River studied previously by Moyle and Brown (1970,1985,1986) where Kern brook lamprey had been found. We electroshocked and collected several specimens for identification purposes. Dr. Beamish will conduct a complete morphometric and DNA analysis on the collected species. Next year we plan to conduct distribution surveys on the Kings River, and portions of the Merced and San Joaquin to further study the distribution of the Kern brook lamprey.

## Six Rivers National Forest

Contacts: Jerry Boberg/David Fuller  
(707) 442-1721 (R05F10A)

### *Anadromous FHR Program*

The anadromous FHR Program based at Six Rivers National Forest continues to grow to meet the technical information needs for management of watersheds with anadromous fishes. The anadromous FHR Program is involved both within the region and at a national level. This year the program provided financial support for FHR projects to the Klamath NF, Sierra NF, PSW-Berkeley, and the Institute for River Ecosystems. A team of biologists from throughout the region and PSW have been developing a program document for the Region 5 FHR Program which defines goals, objectives, responsibilities, and outputs. This document will be completed by October 1992. An increasingly big issue for the anadromous forests is the threat of extinction of fish species and amphibians. Future plans are to find strategies to effectively deal with this issue in a proactive manner.

On the national level, Jerry Boberg is part of a national committee working on developing a monitoring process for the Forest Service that will become part of the Forest Service Manual. The committee has completed a draft document and will seek input from each Forest Service region in the near future. David Fuller is part of a national committee to define stream survey parameters and define a core set of parameters that can be used nationally. This committee is working on a draft document and plans to output this information in an upcoming issue of FHR Currents. R-5 will host the next national FHR meeting this December.

### *Forest Efforts*

Contact: Jerry Boberg  
(707) 442-1721 (R05F10A)

Six Rivers National Forest has been conducting studies on "barometer" watersheds for the past eight years. Barometer watersheds are identified as

important tributaries to major anadromous fish rivers on the Forest. This last year we continued downstream migrant trapping on Camp Creek (Klamath River tributary) and Horse Linto and Willow creeks (tributaries to the Trinity River). Part of the objectives of these studies are to test the effectiveness of tube traps.

Through a cooperative project between the Forest Service, Humboldt State University and the Fisheries Coop Unit (USFWS), an address matching technique on pcArcINFO was used to successfully integrate habitat typing data into a GIS spatial database. This project used data from Grouse Creek (the barometer watershed for the South Fork Trinity River). Having the data on a GIS allows stream information to be queried and displayed in relation to upslope features. This type of information display has been quite valuable to the staff on the Forest and promises to be an important tool for evaluating management of watersheds.

Last year a study was completed on the repeatability of the Region 5 habitat classification system. Two streams that had been surveyed in previous years were re-surveyed. Data showed that the area and frequency of habitat types differed significantly from one survey to the next and that most of this difference was found in fast-water habitat types (riffles and runs) while slow-water types (pools and backwaters) showed lesser differences. Other measured and estimated parameters were tested. Coincidentally, the repeatability of habitat typing was tested by PSW and the Stanislaus National Forest during 1991. The combined results of these studies will be made available in the near future.

For the third consecutive year, the total fish abundances will be estimated on the anadromous section of Horse Linto Creek. The purpose of repeated estimates of fish abundance is to look at year-to-year variation in overall abundance and use of habitat. Data from 1990 and 1991 shows very little difference in the overall estimates of fish abundance but noticeable difference in habitat utilization. This study will continue for another two years.

This year a study was initiated to examine the effect of fish habitat improvement structures on the



breeding habitat of foothill yellow-legged frogs. A preliminary study showed an absence of frog breeding in a stream reach after it had been treated with boulder deflectors. The foothill yellow-legged frog is a state Species of Special Concern and a Category 2 Species for federal listing. This year's study measured several microhabitat variables of the frog egg masses in an effort to define suitable breeding habitat. Next year's plans are to monitor suitable breeding habitat in stream reaches treated by fish habitat improvement structures.

A study on food availability for juvenile chinook salmon will be conducted this year in Camp Creek. Sampling design and net design have been worked out and data collection is underway. Invertebrate drift in pools that have contained consistently high densities of juvenile chinook salmon will be compared to pools with consistently low densities of juvenile chinook. The intent of this study is to examine the role of food availability in habitat selection.

## Smith River National Recreation Area

Contact: Mike McCain  
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### *LWD/stream habitat/aquatic vertebrate administrative study*

We are in the third year of this study looking into the links between hillslope, riparian, and stream communities by combining landscape level ecological classification, stream habitat inventories, LWD jam mapping, and fish and amphibian distribution and abundance surveys across an array of watersheds. These watersheds each have a unique management and 'natural' history. Preliminary results of this study indicate: (1) Abundance of intact historic natural LWD jams is higher in small headwater sections than in lower larger channels. This is due to variation in channel response to the 1964 flood and in the amount and intensity of mining and salvage activities. Upper tributaries and their LWD load could be very important in the long term delivery of

LWD to lower sections, especially where recruitment from downstream adjacent streamside stands is below potential; and (2) Streamside forest canopy and stands vary greatly between high serpentine harsh sites and non-serpentine areas. Potential LWD from serpentine hillslopes could be limited due to the sparse stunted knobcone and jeffrey pine. The predominate LWD species and streamside conifer is Port-Orford cedar in high serpentine drainages, having a long life as down-wood and log jams due to a slow rotting rate. LWD jams formed by Port-Orford cedar could take a long time to accumulate and be very critical to stream habitat due to the lack of other suitable LWD species. However, several watersheds in the Smith River drainage have been infected with a water born root rot fungus that attacks and kills Port-Orford cedar, threatening the species as a whole across the entire drainage.

### *Natal stream vs. mainstem vs. estuary use, and emigration patterns of juvenile chinook salmon*

We are in the process of setting up a study to track when and how long juvenile chinook salmon use these three major parts of the river. Preliminary work in tributaries indicates that approximately 90 percent of the young-of-the-year cohort may emigrate from natal streams within 60 to 90 days, and move downstream into the mainstem Smith River and on to the estuary. We are following up on the tributary investigations by inventorying habitat and monitoring its use in mainstem and estuary reaches to determine what type of habitat is used and when temporal shifts occur. Mainstem habitat will be initially typed using the Bisson et al. (1981) and McCain et al. (1991) approaches. Estuary habitat typing will follow a protocol being developed for estuaries and wetlands nationwide where substrate, benthic fauna, and vegetation are used to delineate habitat types. Chinook salmon will be observed as to habitat use and collected to relate ontogenetic development to changes in habitat use and downstream migration. This study will lay the groundwork for a long term system-wide analysis of the Smith River chinook salmon fishery.

### *Habitat use and demographics of resident cutthroat trout*

The Smith River has a limited number of resident stream reaches where small populations of cutthroat trout exist due to natural anadromous barriers. The concern of preserving and maintaining salmonid stocks brought us to begin looking at some basic life history and habitat relationships of these resident cutthroat populations. The first year involved a basin-wide habitat inventory, population estimation, LWD inventory, and a longitudinal profile locating slope breaks and Rosgen channel types being completed in Little Jones Creek, a tributary to the Middle Fork Smith River. Preliminary results show a population in the lower 2.2 miles of 4958 fish (+/- 198), that is distributed predominately among bedrock and LWD formed pools. A dense alder canopy, in response to intense streamside harvest, has formed and may limit primary productivity in certain reaches. Fish distribution and habitat use may be determined to some degree by drift availability from riffles.

## Stanislaus National Forest

Contacts: Bob Ruediger/Jerry Ward  
(209) 532-3671 (R05F16A)

The fisheries program on the Stanislaus National Forest has been involved with the revision of allotment management plans, reforestation issues, and hydropower issues, and completing several stream habitat survey reports.

We have been involved on two ID teams for the revision of allotment management plans on allotments within three different Wilderness Areas. In 1991 we found a previously unknown population of Lahontan cutthroat trout (a "threatened" species) in Milk Ranch Creek, a small stream in one of these allotments. We are planning to build a riparian exclosure fence on a one-mile section of Milk Ranch Creek in 1992. The fence will be within the Wilderness and is providing several challenges about Wilderness fence construction and maintenance. The fence will be built by a CCC trail crew. The Range program is cooperating in the funding of

this project. Stream survey efforts in 1992 will emphasize streams in grazing allotments.

In 1991 we surveyed and mapped the large woody debris in three stream reaches in order to monitor the stability of wood in the channel. In 1992 we intend to re-survey these reaches and will be tagging all large wood pieces for future identification. This year's work is being done in conjunction with the Regional FHR program. We will also be involved with the Desired Future Condition study, another FHR study. We will be habitat typing stream reaches in timbered streams of western Yosemite National Park.

Between 1989 and 1991, the Stanislaus National Forest completed several boulder cluster habitat improvement projects on the Middle Fork Stanislaus River. In 1992 we plan to begin monitoring some of these project sites to determine the usefulness of this type of structure in trout streams.

## Tahoe National Forest

Contact: Ann Carlson  
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This is a busy year for the Tahoe National Forest Fish Program. Emphasis areas of our program include: (1) Maintaining and improving riparian ecosystems by integrating resource planning and management on the Forest; (2) Increasing cost-share projects and partnerships to improve fish habitat; and (3) incorporating aquatic resources into our Forest environmental education program.

Last summer and fall, Fisheries joined Wildlife in a literature review and biologist working group to develop recommendations for managing Old Forest and Riparian Ecosystems. The Forest Fish Biologist is presently a member of the Forest ID Team evaluating these recommendations and beginning an interdisciplinary process to amend the Forest Land and Resource Management Plan.

In 1991, the Tahoe selected Perazzo Creek to illustrate New Perspectives and resource manage-



ment at a watershed scale. Fisheries is excited to be a major coordinator of this project. Currently, we are cooperating with the forest hydrologist, range conservation officer, and district wildlife biologist to write the Perazzo Demonstration Watershed Management Plan. The resource team will address complex and conflicting issues such as grazing in riparian areas, timber management, willow fly-catcher habitat, instream fisheries habitat, channel integrity, and water quality to create an integrated plan. This plan will serve as an "umbrella document" linking planned land management activities within the Perazzo Creek Watershed and give multi-year direction to the stewardship of the resources. Proposals to improve fisheries habitat within Perazzo Meadows have been developed based on limiting factors determined by habitat inventories, and funding sources are being sought.

Several fisheries improvements are scheduled for the 1992 season. We will implement two state-funded habitat rehabilitation projects on Prosser Creek and a short stretch of the Truckee River. Other restoration efforts include fish passage, KV, and Adopt-a-Stream projects. An established high school Adopt-a-Stream program is beginning its fourth season restoring fisheries habitat on two forest streams.

This summer, a resource crew consisting of hydrology and fisheries technicians will survey watersheds and collect data on the condition of the channel, upslope, and vegetation as well as instream habitat to provide the resource specialists with on-Bite information for timber sale planning at the District Level. More intensive fisheries habitat inventories will be conducted on streams identified as having a special fisheries concern.

We have moved forward in our public education and partnership efforts. Our first Fisheries Awareness Event was scheduled during National Fishing Week. We coordinated with Gold Country Fly Fishers, Big Brothers/Big Sisters, and the California Department of Fish and Game to organize this event for local underprivileged youths. We are participating in the Forest's "Teacher Education Workshops" and Shadow Program providing field classes in aquatic ecology. We continue to coordinate the established

Adopt-a-Stream program and are developing two new programs on the Forest.

Pacific Southwest  
Research Station  
Redwood Sciences Laboratory  
Wildlife Habitat Unit

Contacts: Hart Welsh and Amy Lind  
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*Frog monitoring and other herpetofauna  
research on R-5 national forests*

In the summer of 1991 we proposed a monitoring protocol for frogs and toads on Region 5 forests. *FHR Currents* Number 4 (May 1991) describes this protocol, gives background information, has species descriptions and a key, and provides a sample data form. The goal of this project was to establish baseline information on frog and toad populations in conjunction with a systematic sampling of streams (habitat typing) for fish.

Because this proposed frog sampling protocol was not included in the Fish Habitat Assessment Handbook, we would like to reiterate a few points on the value of amphibians, and frogs in particular, as indicators of the health of aquatic systems. We had several reasons for choosing frogs both as subjects for assessing baseline distributions and for long-term monitoring. First, there is evidence of a worldwide decline in frog populations and we believe it is critical to fill in gaps in information on their distributions throughout the state. Second, they are tied to both aquatic and terrestrial habitats at different stages in their lives, making them susceptible to disturbance throughout the riparian zone. Lastly, the majority of species are diurnal; egg masses and tadpoles are easily spotted and adults are often active along the edges of streams and may be easily counted as workers move along the stream.

We are encouraged to hear that several forests are collecting data on frogs during their stream habitat

typing and some have established amphibian databases for lakes, as well. We think this will help establish baseline information on distributions of frogs and hope that those of you who have not initiated these efforts will be able to do so in the near future. We plan to establish a database at our lab within the next year or so that will allow us to summarize frog data on a Regional scale. We encourage you to establish long-term monitoring programs for frogs on at least one stream basin in every district of your forests. Such a program could be designed similarly to long-term monitoring of fish populations and the frog counting protocol we introduced in the May 1991 *FHR Currents* could be adapted for such a project. We advise that preliminary sighting data be collected first from around each district to help determine which of your streams would best provide sufficient numbers of individuals for detecting changes in populations levels over extended periods of time.

### *Current Research*

We are presently conducting research on five species of riparian herpetofauna in Northern California. These are described briefly below; if you want more information, please contact us.

- Reproductive biology, demographics, movements, and habitat associations of the western pond turtle (*Clemmys marmorata*). This is a four year study, funded by the Trinity River Restoration Council on the main and south forks of the Trinity River. The study used mark/recapture, telemetry, and visual survey methods.

- Reproductive biology and habitat associations of the foothill yellow-legged frog (*Rana boylei*). This is a three-year study, also funded by the Trinity River Restoration Council, on the main and south forks of the Trinity River. This study uses visual counts and habitat quantification methods. In addition, our protocol for describing breeding and rearing habitat is being used by Dave Fuller of the Six Rivers NF to assess relationships between frog habitat use and instream fisheries habitat improvement structures.

- Mesohabitat distribution and microhabitat associations of a stream amphibian community -- the Smith River NRA (a part of the Six Rivers NF) the Redwood Sciences Lab and CDF&G and conducted by Lisa Ollivier. The study focuses primarily on the tailed frog (*Ascaphus truei*) and Pacific Giant Salamander (*Dicamptodon tenebrosus*, formerly *ensatus*) in a set of streams that have experienced Port-Orford Cedar harvesting and a set that is unharvested.

- Amphibians in mid to high elevation lakes of the Klamath Region. This study is a joint effort with the Six Rivers NF and is starting this year. We hope to expand these surveys to other Klamath region forests in the future. Our objectives are to determine the current status of each lake including: water quality, lake topography, fish species presence and size distribution, aquatic vegetation, invertebrate species presence, and presence and relative abundance of amphibians and reptiles.

- Demography, habitat use, and food habits of the western aquatic garter snake (*Thamnophis atratus*, formerly *couchii*). We are beginning our seventh field season of this study which uses a mark/recapture method to study population dynamics, prey choice, and movement as well as habitat use of this mid-level aquatic predator at Hurdygurdy Creek (a tributary to the south fork of the Smith River).

## Pacific Southwest Research Station Redwood Sciences Laboratory Hillslope Processes/Fish Habitat Unit

Contact: Tom Lisle  
(707) 822-3691 (S27L01A)

We continue to develop the relative volume of fine sediment in pools as an index of the supply of mobile sediment in streams and substrate conditions for stream organisms (*FHR Currents* 6). We are working with the Klamath National Forest to monitor fines in pools in the Salmon River and to establish base-line conditions in nearly pristine tributaries. Rod Nakamoto is measuring fish com-



munities in pools of streams with contrasting volumes of fines. This study parallels one by Gordie Reeves (PNW) in Oregon. We also have a grant from the California Division of Forestry to measure fines in pools in twenty streams throughout California that are either pristine or have sediment-yield data. This should help us to better understand the role of geology and land use on fines in pools. Any suggestions of study streams would be greatly appreciated! Our paper, "The volume of fine sediment in pools: an index of sediment supply in gravel-bed streams" by Lisle and Hilton, was accepted by Water Resources Bulletin, and we are putting the finishing touches on a how-to manual, "Measuring the relative volume of fine sediment in pools" by Hilton and Lisle. Finally, we put on two one-day training courses in June.

**Pacific Southwest  
Research Station, Berkeley  
Cumulative Effects &  
Inland Fisheries Unit**

Contacts: David Azuma (510) 559-6453  
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Neil Berg (510) 559-6451

*Regional Fish Database*

Many forests in Region 5 of the Forest Service have collected fish habitat inventory data for several years. Portions of that information will soon be integrated into a "master" database. Development and manipulation of the master database should provide: (1) one means of evaluating the utility of inventory methods currently in use; (2) baseline information for use in project evaluations; (3) data potentially amenable to quantification of desired future conditions; insight on differences in habitat attributes between eco-regions or ichthyological provinces in California; and (3) a single source of information to expedite future references to fish habitat inventory information in California.

The database is intended to extend into the near future. As more information becomes available, the database may evolve to incorporate different physical and biological parameters.

**Liaison Between PSW and the  
Regional Office**

Ken Roby  
(510) 559-6300 (S27A) or  
Plumas National Forest  
(916) 284-7126 (R05FIIID52A)

I've recently been selected to serve as a liaison between the PSW research Station and the Regional Office and R-5 forests on fisheries and watershed issues. The position is a one year detail, and is the result of a recognized need at both the station and the RO for better coordination between "research" and the forests, and between watershed and fisheries specialists. I'll be working under the supervision of Dr. Neil Berg, who heads up PSW/Albany's Cumulative Effects/Inland Fisheries Research Unit, but will also be working closely with the RO staffs and, I hope, you.

Among the objectives outlined for the position are:

- Identification of technology transfer and professional development needs, and development of strategies to address those needs.
- Improvement of interaction, integration and coordination between fisheries and watershed within the Region, and between the Region and PSW.
- Identification of existing, planned and potential New Perspectives approaches to management of watershed, riparian and aquatic systems.
- Identification of pressing regional fisheries, riparian and watershed issues, and translation into research questions.
- Assistance to forests in development of resource survey and monitoring methods and plans.

I hope to meet with each of the watershed and fisheries specialists in the region during this year. I need to get your views on the issues outlined above. Please do not hesitate to contact me if you have a specific or general question, a research or monitoring need or want to find out more about what the heck I'm doing.



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